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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/811,748	03/29/2004	Matthew J. Everett	ZEIS-500	1680

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EXAMINER	
ANDERSON, DENISE BROWN	
ART UNIT	**PAPER NUMBER**
2877	

DATE MAILED: 04/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/811,748	EVERETT ET AL.	
	Examiner	Art Unit	
	Denise B. Anderson	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-75* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-22* is/are allowed.

6)☒ Claim(s) *23-43,56,62 and 69* is/are rejected.

7)☒ Claim(s) *44-55,57-61,63-68 and 70-75* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/29/04, 8/05&9/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claims 1, 20, 23, 53, 55, 58, 70, 72 and 74 are objected to because of the following informalities:

Claim 1 (line 13 of page 1), recites the limitation "the light wave". There is insufficient antecedent basis for this limitation in the claim. Examiner suggests the following correction: eliminate the word “the” before light, and add an “s” to the words “wave” and “arm” in line 14.

Claim 20 (line 29 of page 3) is confusing. Examiner suggests adding the words “and splitting the light” after the word “splitter” in line 29.

Claim 20 (line 2 of page 4), recites the limitation "said beam splitter". There is insufficient antecedent basis for this limitation in the claim. It is confusing as to whether the NPBS or PBS is being referred to here. Examiner suggests the following correction: change “said beam splitter” to “said non-polarizing beam splitter”.

Claim 23 (line 23 of page 4), recites the limitation "the light wave". There is insufficient antecedent basis for this limitation in the claim. Examiner suggests the following correction: eliminate the word “the” before light, and add an “s” to the words “wave” and “arm” in line 24.

Claims 53 and 55 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s)

in proper dependent form, or rewrite the claim(s) in independent form. Claim 53 recites the same limitations of claim 49. Claim 55 recites the same limitations of claim 51.

Claim 58 (line 21 of page 9), recites the limitation "the detector arm". There is insufficient antecedent basis for this limitation in the claim. Examiner suggests the following correction: eliminate the word "arm".

Claim 70 (lines 10-11 of page 11), recites the limitation "the detector". There is insufficient antecedent basis for this limitation in the claim. Examiner suggests the following correction: replace the words "the detector" by "the measurement of the recombined beam".

In claims 72 and 74, examiner suggests the following correction: include the word "the" between "wherein" and "step".

In claim 74, the location of phrase "in their respective sample and reference paths" makes the claim confusing. Examiner suggests eliminating the phrase, as it is clear that that rotating of the polarization takes place on both beam portions (i.e., reference and sample paths) before they are recombined.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 56 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See

MPEP § 2172.01. The omitted structural cooperative relationships are: the location of the balanced detector with respect to the first detector.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 23, 24, 27, 30, 31, 33, 35-38, 41-43, 62 and 69 are rejected.

Claims 23, 42, 43, 62 and 69 are rejected under 35 U.S.C. 102(b) as being anticipated by Imalux Corporation (EP 1,253,398 A1).

As to claim 23, Imalux Corporation discloses in figure 2, a source arm 17 with a light source 1; a polarizing beam splitter 3 with an import 2 connected to the source via the polarizer 18 and 3 output ports 4,6,12; a sample arm 16 leading to sample 10 and connected to output port 4 of beam splitter 3; a reference arm 7 leading to a reflector 8 and connected to output port 6; polarization manipulator 9,11 for rotating the polarization in the sample and reference arms, respectively; and a detector 13,21 for collecting light combined by beam splitter 3 and directed to third output port 12 of beam splitter 3 for interference signal detection and processing via data processing unit 14.

As to claim 24, Imalux Corporation discloses samples that may be biological (paragraph 0002).

As to claim 27, Imalux Corporation discloses a probe module for 2-D scanning (paragraph 0062).

As to claim 30, Imalux Corporation discloses a polarized light source (paragraph 0009).

As to claim 31, Imalux Corporation discloses as un-polarized light source (paragraph 0008).

As to claim 33, Imalux Corporation discloses a power splitting ratio that is sends 90% of the power from the source to the sample arm for increasing optical efficiency (paragraph 0009).

As to claim 35, Imalux Corporatioin discloses the use of an optical delay line (paragraphs 0003 and 0008).

As to claim 36, Imalux Corporation discloses that polarization switches 9,11 in figure 2 can be Faraday rotators (paragraph 0040 or 0064) and that the rotators have a rotation angle of 45 degrees (paragraph 0086). In this case the integer M is zero.

As to claims 37 and 38, Imalux Corporation discloses that polarization switches 9,11 in figure 2 can be quarter-wave plates (paragraph 0064). In this case the integer M is zero.

As to claim 41, Imalux Corporation discloses the use of low-coherence sources (paragraph 0003).

As to claim 42, Imalux Corporation discloses in figure 1, a guiding light (source 1) being directed to a polarization beam splitter 3 and being split into reference and sample arms (reference arm 7 leads to a reflector 8 and sample arm 5 leads to a sample 10). Switches 11 and 9 rotate the polarization of the reference and sample arms, respectively prior to reentering beam splitter 3. Beam splitter 3 recombines the

returned sample and reference light waves and directs the interference signal to detector 13, which is further connected to a data processing and display unit 14 for analyzing the interference data. (paragraph 0067).

As to claim 43, Imalux Corporation discloses in figure 2, a light source 1, a path splitter 3 for dividing the beam into reference and sample paths 5,7; a detector (13,21) for measuring the recombined beam; a polarization sensitive element (polarizer 18); polarization rotating element 9,11 which rotates the polarization "after" first passing through the polarizer sensitive element 18 in such a way that the returned beams are recombined by the beam splitter 3 and directed to polarizer 18, which directs light away from the source via path 20; and a processor 14 for evaluating the interference signals from the detectors 13,21.

As to claim 62, Imalux Corporation discloses a power splitting ratio that is sends 97% of the power from the source to the sample arm, which is at least 70% (paragraph 0061).

As to claim 69, Imalux Corporation discloses in figure 2, generating a light beam (source 1) polarizing the light beam (polarizer 18); splitting the beam into sample and reference paths (5 and 7), respectively; recombining returned reference and sample paths (via beam splitter 3), rotating the polarization of the reference and sample path beams (polarization switches 11 and 9, respectively); redirecting the combined beam along a measurement path using polarization sensitive optic (beam 20 from polarizer 18); measuring the recombined beam (detectors 21 and 13); and evaluating the sample (data processing unit 14).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 25, 26, 28, 29, 32, 34, 39 and 40 are rejected.

Claims 25 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imalux Corporation as applied to claim 23 above, and further in view of Wang et al (USPN 6,961,123).

As to claim 25, Imalux Corporation discloses in figure 1, a sample 10 under investigation. Imalux Corporation does not expressly disclose that the sample is an eye. Wange et al discloses that the sample can be a retina (column 2, lines 28-30). It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the sample of Imalux Corporation with the retina of Wang et al for the purpose of studying a different biological sample.

As to claim 40, Imalux Corporation discloses in figure 2, detectors 13,21 for collecting the interference signals. Imalux Corporation does not expressly disclose that the detector is polarization sensitive. Wang et al disclose, in figure 1, polarization sensitive detectors PDV and PDH. It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the detectors of Imalux Corporation with

the polarization sensitive detectors of Wang for the purpose of obtaining additional information about a sample through the study of different polarization states.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imalux Corporation as applied to claim 23 above, and further in view of Everett et al (USPAPN 2002/0093655 A1).

As to claim 26, Imalux Corporation discloses that the optical interferometer can be partially or fully composed of bulk optics and fiber optics (paragraphs 0003, 0060, 0069, and figures 3 and 4). Therefore, Imalux Corporation suggests that any specific portions of the interferometer can be bulk or fiber optics depending on the application. It is further noted that Everett et al discloses a motivation for combining free space and fiberoptics (paragraphs 0040 and 0041). It would have been obvious to one of ordinary skill in the art at the time of the invention to replace any portion of the invention of Imalux Corporation with a combination free space and/or fiberoptics as described in Everett et al for the purpose of making the system more deployable or for saving on the cost of components or for improving alignment.

Claims 28, 32, 34 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imalux Corporation as applied to claim 23 above, and further in view of Applicant's Admitted Prior Art (AAPA).

As to claim 28, Imalux Corporation discloses in figure 2, detectors 13,21 for collecting the interference signals. Imalux Corporation does not expressly disclose that the detector includes an optical dispersive element and a detector array. AAPA discloses the use of an optical dispersive element (diffraction grating) with an array of

detectors for the purpose of creating a spectral domain OCT system (page 6, lines 28-29 and page 7, lines1-2). It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the detector of Imalux Corporation with the detector/diffraction grating combination of AAPA for the purpose of creating a spectral domain OCT system.

As to claims 32 and 34, Imalux Corporation discloses the claimed invention except for polarization controllers in the source arm and sample arm. AAPA discloses the use of polarization controllers in the source arm (claim 32) and in the sample arm (claim 34). It would have been obvious to one of ordinary skill in the art at the time of the invention to use polarization controllers of AAPA in the sample and source arms of Imalux Corporation for the purpose of achieving the desired polarization from the source and from the light scattered from the sample, thereby improving the detected signal.

As to claim 39, Imalux Corporation discloses in figure 1, polarization switches 9,11, which can be quarter wave plates (paragraph 0021 and 0064). Imalux Corporation does not expressly disclose that the quarter wave plates are dynamically controllable. AAPA (page 34, lines 1-14) discloses that it is well known to those skilled in the art to use a dynamically controlled quarter wave plate. It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the polarization switches of Imalux Corporation with dynamically controllable quarter wave plates described in AAPA for the purpose of compensating for polarization distortions (as described in paragraph 0064 of Imalux Corporation and in AAPA).

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imalux Corporation as applied to claim 23 above, and further in view of Izatt et al (USPAPN 2005/0036150 A1).

As to claim 29, Imalux Corporation discloses in figure 1, a source of radiation 1. Imalux Corporation does not expressly disclose that the source is a swept source. Izatt et al discloses a swept source (figure 2b) for achieving significantly superior signal to noise ratio compared to conventional OCT systems (paragraph 0040). It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the source of Imalux Corporation with the swept source of Izatt et al for the purpose of achieving a significantly superior signal to noise ratio.

Allowable Subject Matter

Claims 1-22, 44-61, 63-68, and 70-75 are allowed.

Claims 44-61, 63-68 and 70-75 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 1 and 20 are allowed because the prior art of record, taken alone or in combination, fails to disclose or render obvious the specific combination of a PBS, NPBS, and polarization rotators together in combination with the rest of the limitations of claim. Claims 2-19 and 21-22 are allowed because they depend on allowed independent claims (1 and 20, respectively).

Claim 44 is allowable because the prior art of record, taken alone or in combination, fails to disclose or render obvious the specific combination of a PBS, NPBS, and polarization rotators together in combination with the rest of the limitations of claim. Claims 45- 61 and 63-68 are allowed because they depend on claim 44.

Claim 70 is allowable because the prior art of record, taken alone or in combination, fails to disclose or render obvious the specific combination of a PBS, NPBS, and polarization rotators together in combination with the rest of the limitations of claim. Claims 71-75 are allowed because they depend on claim 70.

Fax/Telephone Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Denise B. Anderson whose telephone number is 571-272-8324. The examiner can normally be reached on Mon-Fri (9:30 AM - 6 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley Jr. can be reached on 571-272-2800 ext. 77. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Denise B. Anderson, Ph.D.
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DBA
Date signed: 3/24/06

Gregory J. Toatley, Jr.
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HWA (ANDREW) LEE
PRIMARY EXAMINER